It is disappointing to find that no mention is made of the gametophyte in ascertaining the relations of the classes to one another; although its systematic value has been shown in several cases. It is quite possible that the position of doubtful genera, such as Loxsoma, will only be understood when its gametophyte has received complete investigation. The omission, however, may be justified owing to the practical difficulties of obtaining the sexual generation for systematic purposes.

The introduction is short and is chiefly occupied with explaining the scope of the book; and it seems a pity that a writer, with so much knowledge of the ferns, did not give more space in his work to general considerations. At the end, however, Dr. Christ refers to the marked manner in which ferns belonging to different classes resemble one another: thus, Diacalpe—a member of the Aspidiaceæ—has a sorus very like that found in the Cyatheaceæ. In the Polypodiaceæ some genera have the sorus situated at the tip of the veins and projecting beyond the margin of the leaves, in this reminding us of the Hymenophyllaceæ. It is fanciful, if not inaccurate, to see in this position of the sorus a resemblance to the mosses. Other interesting examples are given; but it is unfortunate that the author applies the term "mimicry" to these instances of parallelism in related groups. Such an application of the term must only lead to confusion.

The descriptions of the genera and species are marked by their precision and lucidity, and the numerous illustrations, which were specially prepared for this work, are characteristic drawings, though sometimes roughly executed. The appearance of such a book will be welcomed by systematists interested in the ferns containing, as it does, the more recent results of Baker, Hooker, Kuhn, Luersson, Prantl, &c., and those of Dr. Christ himself.

It might be suggested that if the key of genera, which precedes the detailed diagnoses of genera and species, was furnished with references to the pages on which the diagnoses are to be found, an addition would be made to the usefulness of the book. H. H. D.

SCIENCE IN FICTION.

The War of the Worlds. By H. G. Wells. Pp. 303. (London: William Heinemann, 1898.)

MANY writers of fiction have gathered material from the fairy-land of science, and have used it in the construction of literary fabrics, but none have done it more successfully than Mr. H. G. Wells. It is often easy to understand the cause of failure. The material may be used in such a way that there appears no connection between it and the background upon which it is seen; it may be so prominent that the threads with which it ought to harmonise are thrown into obscurity; or (and this is the worst of all) it may be employed by a writer whose knowledge of natural phenomena is not sufficient to justify his working with scientific colour. Mr. Wells makes none of these mistakes. Upon a groundwork of scientific fact, his vivid imagination and exceptional powers of description enable him to erect a structure which intellectual readers can find pleasure in contemplating.

"The Time Machine"—considered by the majority of scientific readers to be Mr. Wells' best work—showed at once that a writer had arisen who was not only familiar with scientific facts, but who knew them intimately enough to present a view of the future. "The Island of Dr. Moreau," though decried by some critics, is a distinctly powerful work, and the worst that can be said of it is that the pabulum it provides is too strong for the mental digestion of sentimental readers. But in several respects "The War of the Worlds" is even better than either of these contributions to scientific romance, and there are parts of it which are more stimulating to thought than anything that the author has yet written.

The invasion of the earth by inhabitants of Mars is the idea around which the present story is constructed The planet is, as Mr. Percival Lowell puts it, older in age if not in years than the earth; and it is not unreasonable to suppose that if sentient beings exist upon it they would regard our world as a desirable place for occupation after their own globe had gone so far in the secular cooling as to be unable to support life. Mr. Wells brings the Martians to the earth in ten cylinders discharged from the planet and precipitated in Surrey. The immigrants are as much unlike men as it is possible to imagine, and only a writer familiar with the lines of biological development could conceive them. The greater part of their structure was brain, which sent enormous nerves to a pair of large eyes, an auditory organ, and sixteen long tactile tentacles arranged about the mouth; they had none of our complex apparatus of digestion, nor did they require it, for instead of eating they injected into their veins the fresh living blood of other creatures. Their organisms did not sleep any more than the heart of man sleeps; they multiplied by budding; and no bacteria entered into the scheme of their life. When they came to the earth they brought with them a means of producing a ray of intense heat which was used in connection with a heavy vapour to exterminate the inhabitants of London and the neighbourhood.

This bald outline does not, however, convey a good idea of the narrative, which must be read before the ingenuity which the author displays in manipulating scientific material can be appreciated. The manner in which the Martians are disposed of is undoubtedly the best instance of this skill. As the Martians had eliminated micro-organisms from their planet, when they came to the earth their bodies were besieged by our microscopic allies, and they were destroyed by germs to which natural selection has rendered us immune. This is a distinctly clever idea, and it is introduced in a way which will allay the fears of those who may be led by the verisimilitude of the narrative to expect an invasion from Mars. Of course, outside fiction such an event is hardly worth consideration; but that the possibility of it can be convincingly stated, will be conceded after reading Mr. Wells' story. A remarkable case of the fulfilment of fiction is furnished by the history of the satellites of Mars. When Dean Swift wrote "Gulliver's Travels" (published in 1726), he made the astronomers on the island of Laputa not only observe two satellites, but caused one of these to move round the planet in less time than the planet itself takes to rotate on its axis.

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As every student of astronomy now knows, the satellites were not discovered until 1877, and one of them actually does revolve round Mars three times while the planet makes a rotation. The coincidence is remarkable; but it is to be hoped, for the sake of the peace of mind of terrestrial inhabitants, that Mr. Wells does not possess the prophetic insight vouchsafed to Swift.

In conclusion, it is worth remark that scientific romances are not without a value in furthering scientific interests; they attract attention to work that is being done in the realm of natural knowledge, and so create sympathy with the aims and observations of men of science. R. A. G.

OUR BOOK SHELF.

Introductory Course in Differential Equations. By D. A. Murray, B.A., Ph.D. Crown 8vo. Pp. xv + 234. (New York and London: Longmans, Green, and Co., 1897.)

Ordinary Differential Equations; with an Introduction to Lie's Theory of the Group of One Parameter. By James Morris Page. Crown 8vo. Pp. 226 + xviii. (London: Macmillan and Co., 1897.)

MR MURRAY'S book is adapted to provide for students that knowledge of the subject of differential equations which they are likely to want in applications of mathematics to physics, and in the general courses in arts and science in "classical" colleges. The author is chiefly occupied with giving expositions of the devices usually employed in the solution of the simple differential equations which such students meet with, and he will be found a safe guide in these matters. He follows the plan, which most recommends itself to teachers, of omitting theoretical considerations, or postponing them until the student has had practice in carrying out the processes with which he must be acquainted before the theory can be understood. But he does not leave the reader altogether in the dark as to the underlying theory and the modern developments. These are considered near the end of the book in a series of notes, which ought to prove very useful to those who wish to know more about the subject than can be learned from the text. In one case, that of the integration of linear equations in series, the author has departed from his general practice of giving an account of the simple and particular rather than of the difficult and general. It seems unfortunate that he did not choose for discussion the forms of the series which satisfy such equations in the neighbourhood of ordinary points. When a second edition is called for he will do well to alter this, and to avoid such expressions as "concentric cylinders" and "consecutive curves." The book is well printed, and is adequately supplied with well-chosen examples, some of them relating to physical subjects; and it ought to prove of service both to those for whom it is primarily intended, and also to British students who have not time to master Forsyth's treatise, but wish to learn rather more about the subject than is to be found in Lamb's "Infinitesimal Calculus."

In several important respects Mr. Page's book differs considerably from most existing text-books on differential equations. It is not sufficiently elementary for students reading the subject for the first time, since it makes no attempt to supply that thorough drilling in the solution of linear equations with constant coefficients and other simple forms, which our Universities insist on as a preliminary test of proficiency. Those, however, who have passed beyond the threshold of the subject, and who wish to study the general machinery underlying the methods they have learnt, will find in Mr. Page's work the first attempt to present to English readers a concise account of some of Prof. Lie's important developments of the theory of transformation groups, by which he has shown that the usual methods are only applicable to such differential equations as admit of known infinitesimal transformations. A great many of the methods here described are due exclusively to Prof. Lie; the examples at the end of each chapter are, however, largely taken from existing text-books. A feature which strikes us as distinctly good, is the treatment together of simultaneous systems and the equivalent linear partial equation.

The two books before us are thus, to a great extent, complementary in scope. Starting with no knowledge of differential equations, a course of study first under Mr. Murray's and then under Mr. Page's guidance will lead the student by easy stages up to an insight into the Theory of Groups.

Nature Study in Elementary Schools; a Manual for Teachers. By Mrs. L. L. W. Wilson. Pp. xix + 262. Woodcuts. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1897.)

THERE is a notion in this book—a sensible, practicable notion; and this is enough to distinguish Mrs. Wilson's lessons from the common run of school natural histories. Her aim is to stimulate the children to work for themselves; and now and then she succeeds in laying out really interesting work for them, as in the lessons on seedlings and on some common American trees. We recommend the book to the notice of enterprising teachers. In spite of very obvious defects, it may be a guide to better methods than those which prevail at this time. The great fault of the book is the feeble execution of an excellent idea. Many of the lessons do no sort of justice to the objects, and pass over without remark features which ought to arouse the curiosity of the children. We can hardly understand how any teacher could work through the thorn-apple with a class, and then write down so poor a description as that on p. 19. Many of the drawings, particularly those of insects, are too crude and hasty to be produced as examples even of what can be done in school. In the present writer's opinion the mythology and the poetical pieces are overdone. These things may be allowed to come in as extempore illustrations; but when they are laboured, they simply distract the attention and prevent the children from focussing their minds upon the objects.

A word as to the use of printed lessons. On no account should the book be produced in class; that would be to give the solution of the problems in advance. Nor should the teacher reproduce the very lessons given in the book, but devise lessons of his own upon the same lines. In this way the book now before us can be turned to excellent account. L. C. M.

Botanical Microtechnique: a Handbook of Methods of Preparation, Staining, and of Microscopical Investigation of Vegetable Structures. By Dr. A. Zimmermann, Privat-docent in the University at Tübingen. Translated from the German by James Ellis Humphrey, S.D. Pp. xii + 296. (Westminster: Archibald Constable and Co., 1896.)

MODERN advanced work in vegetable, as in animal, histology requires the aid of a refined and often complicated technique in order to render apparent the more difficult details of structure. The zoologist possesses at least one good treatise on methods; but until the appearance, in its English form, at the hands of Dr. Humphrey, of Zimmermann's excellent work, there was no advanced handbook available to a student unacquainted with German. The scope of the book is sufficiently indicated by the title, and under its new form can be confidently recommended to English-speaking students.

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